

**Amendments to the Claims:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

**Please cancel claims 2-45.**

**Please amend the claim as follows:**

Claim 1. (amended): A method of detecting a ~~seizure medical state~~, comprising the steps of:

- a) dividing a digitized waveform of an electroencephalogram (EEG) recording into a plurality of epochs each having a first predetermined duration;
- (b) computing matching pursuit for a given one of the epochs to obtain a plurality of ~~seizure~~ atoms;
- (c) describing the ~~seizure~~ atoms and the given epoch with at least one neural network (NN) rule;
- (d) ~~applying connected object clustering to the epochs in a sliding window of a second predetermined duration to obtain a clustering result; and~~
- (e) ~~establishing a seizure medical state point from the clustering result.~~

**Please add claims 46 – 107**

Claim 46. (New): The method of claim 1, wherein the medical state detected is any rhythmic event found in EEG waveforms.

Claim 47. (New): The method of claim 46, wherein the medical state detected is a seizure.

Claim 48. (New): The method of claim 1, further comprising:

(d) applying connected-object clustering to the epochs in a sliding window of a second predetermined duration to obtain a clustering result; and

(e) establishing a seizure point from the clustering result.

Claim 49. (New): The method of claim 1, further including comparing one or more proximal seizure epochs with one or more proximal non-seizure epochs in the waveform.

Claim 50. (New): The method of claim 1, further including:

grouping the epochs in the waveform to find the optimal number of proximal seizure and non-seizure epochs for identifying the seizure.

Claim 51. (New): The method of claim 1, wherein the at least one neural network is combined with domain expertise to create a neural network rule.

Claim 52. (New): The method of claim 48, further comprising the step of determining whether the seizure point is valid.

Claim 53. (New): The method of claim 48, further comprising the steps of repeating steps of (b)-(e) and determining whether a succeeding seizure point is better than a preceding seizure point.

Claim 54.(New): The method of claim 48, wherein the first predetermined duration is less than the second predetermined duration.

Claim 55. (New): The method of claim 1, wherein the first predetermined duration is about 2 seconds.

Claim 56. (New): The method of claim 48, wherein the second predetermined duration is about 60 seconds.

Claim 57. (New): The method of claim 1, further comprising the step of setting an initial time T=0 prior to the step of computing matching pursuit for the given epoch.

Claim 58. (New): The method of claim 57, further comprising the steps of determining whether unprocessed EEG data is available at the time T, and causing a time delay of a third predetermined duration if unprocessed EEG data is unavailable at the time T.

Claim 59. (New): The method of claim 58, wherein the digital waveform is one of a plurality of waveforms forming a montage of the EEG recording, the method further comprising the steps of obtaining a subsequent waveform of the EEG recording and repeating steps (b)-(e) if unprocessed EEG data is available at the time T.

Claim 60. (New): The method of claim 59, further comprising the step of establishing a seizure event with a plurality of proximal seizure points from the waveforms of the montage.

Claim 61. (New):The method of claim 60, further comprising the step of determining whether the seizure event is valid.

Claim 62. (New): The method of claim 61, further comprising the step of notifying a user that a seizure is identified if the seizure event is valid.

Claim 63. (New): The method of claim 62, further comprising the step of saving the time T and a description of the seizure.

Claim 64. (New): The method of claim 60, further comprising the steps of adding a time of the third predetermined duration to the time T and shifting the sliding window by the time of the third predetermined duration until the EEG recording is finished.

Claim 65. (New): The method of claim 64, wherein the third predetermined duration is about 1 second.

Claim 66. (New): A computer readable medium comprising a plurality of instructions, which when executed by a computer, cause the computer to detect medical state by performing the steps of:

- (a) dividing a digitized waveform of an electroencephalogram (EEG) recording into a plurality of epochs each having a first predetermined duration;
- (b) computing matching pursuit for a given one of the epochs to obtain a plurality of atoms; and
- (c) describing the atoms and the given epoch with at least one neural network.

Claim 67. (New): The computer readable medium as set forth in claim 66, wherein the medical state detected is any rhythmic event found in EEG waveforms.

Claim 68. (New): The computer readable medium as set forth in claim 67, wherein the medical state detected is a seizure.

Claim 69. (New): The computer readable medium as set forth in claim 66, further comprising:

- (d) applying connected-object clustering to the epochs in a sliding window of a second predetermined duration to obtain a clustering result; and
- (e) establishing a seizure point from the clustering result.

Claim 70. (New): The computer readable medium as set forth in claim 66, further including comparing one or more proximal seizure epochs with one or more proximal non-seizure epochs in the waveform.

Claim 71. (New): The computer readable medium as set forth in claim 66, further including:

grouping the epochs in the waveform to find the optimal number of proximal seizure and non-seizure epochs for identifying the seizure.

Claim 72. (New): The computer readable medium as set forth in claim 66, wherein the at least one neural network is combined with domain expertise to create a neural network rule.

Claim 73. (New): The computer readable medium as set forth in claim 69, further comprising instructions which cause the computer to perform the step of determining whether the seizure point is valid.

Claim 74. (New): The computer readable medium as set forth in claim 69, further comprising instructions which cause the computer to perform the steps of:

repeating steps (b)-(e); and

determining whether a succeeding seizure point is better than a preceding seizure point.

Claim 75. (New): The computer readable medium as set forth in claim 69, wherein the first predetermined duration is less than the second predetermined duration.

Claim 76. (New): The computer readable medium as set forth in claim 75, wherein the first predetermined duration is about 2 seconds.

Claim 77. (New): The computer readable medium as set forth in claim 75, wherein the second predetermined duration is about 60 seconds.

Claim 78. (New): The computer readable medium as set forth in claim 66, further comprising instructions which cause the computer to perform the step of setting an initial time  $T=0$  prior to the step of computing matching pursuit for the given epoch.

Claim 79. (New): The computer readable medium as set forth in claim 78, further comprising instructions which cause the computer to perform the steps of:

determining whether unprocessed EEG data is available at the time T; and

causing a time delay of a third predetermined duration if unprocessed EEG data is unavailable at the time T.

Claim 80. (New): The computer readable medium as set forth in claim 79, wherein the digitized waveform is one of a plurality of waveforms of the EEG recording which includes a montage of multiple channels of simultaneous waveforms, the computer readable medium further comprising instructions which cause the computer to perform the steps of:

obtaining a subsequent waveform of the EEG recording; and

repeating steps (b)-(e) if unprocessed EEG data is available at the time T.

Claim 81. (New): The computer readable medium as set forth in claim 80, further comprising instructions which cause the computer to perform the step of establishing a seizure event with a plurality of proximal seizure points from the waveforms of the montage.

Claim 82. (New): The computer readable medium as set forth in claim 81, further comprising instructions which cause the computer to perform the step of determining whether the seizure event is valid.

Claim 83. (New): The computer readable medium as set forth in claim 82, further comprising instructions which cause the computer to perform the step of notifying a user that a seizure is identified if the seizure event is valid.

Claim 84. (New): The computer readable medium as set forth in claim 83, further comprising instructions which cause the computer to perform the step of saving the time T and a description of the seizure.

Claim 85. (New): The computer readable medium as set forth in claim 82, further comprising instructions which cause the computer to perform the steps of:

adding a time of the third predetermined duration to the time T; and

shifting the sliding window by the time of the third predetermined duration until the EEG recording is finished.

Claim 86. (New): The computer readable medium as set forth in claim 85, wherein the third predetermined duration is about 1 second.

Claim 87. (New): An article of manufacture, including a computer readable medium having computer readable program code means embodied therein for detecting a medical state, the computer readable program code means in the article of manufacture comprising:

(a) computer readable program code means for dividing a digitized waveform of an electroencephalogram (EEG) recording into a plurality of epochs each having a first predetermined duration;

(b) computer readable program code means for computing matching pursuit for a given one the epochs to obtain a plurality of atoms; and

(c) computer readable program code means for describing the atoms and the given epoch with at least one neural network.

Claim 88. (New): The article of manufacture as set forth in claim 87, wherein the medical state detected is any rhythmic event found in EEG waveforms.

Claim 89. (New): The article of manufacture as set forth in claim 88, wherein the medical state detected is a seizure.

Claim 90. (New): The article of manufacture as set forth in claim 87, further comprising:

(d) applying connected-object clustering to the epochs in a sliding window of a second predetermined duration to obtain a clustering result; and

(e) establishing a seizure point from the clustering result.

Claim 91. (New): The article of manufacture as set forth in claim 87, further including comparing one or more proximal seizure epochs with one or more proximal non-seizure epochs in the waveform.

Claim 92. (New): The article of manufacture as set forth in claim 87, further including:

grouping the epochs in the waveform to find the optimal number of proximal seizure and non-seizure epochs for identifying the seizure.

Claim 93. (New): The article of manufacture as set forth in claim 87, wherein the at least one neural network is combined with domain expertise to create a neural network rule.

Claim 94. (New): The article of manufacture as set forth in claim 87, wherein the computer readable program code means further comprises computer readable program code means for determining whether the seizure point is valid.

Claim 95. (New): The article of manufacture as set forth in claim 90, wherein the computer readable program code means further comprises:

computer readable program code means for repeating steps performed by computer readable program code means (b)-(e); and

computer readable program code means for determining whether a succeeding seizure point is better than a preceding seizure point.

Claim 96. (New): The article of manufacture as set forth in claim 90, wherein the first predetermined duration is less than the second predetermined duration.

Claim 97. (New): The article of manufacture as set forth in claim 94, wherein the first predetermined duration is about 2 seconds.

Claim 98. (New): The article of manufacture as set forth in claim 96, wherein the second predetermined duration is about 60 seconds.

Claim 99. (New): The article of manufacture as set forth in claim 87, wherein the computer readable program code means further comprises computer readable program code means for setting an initial time T=0 prior to computing matching pursuit for the given epoch.

Claim 100. (New): The article of manufacture as set forth in claim 99, wherein the computer readable program code means further comprises:

computer readable program code means for determining whether unprocessed EEG data is available at the time T; and

computer readable program code means for causing a time delay of a third predetermined duration if unprocessed EEG data is unavailable at the time T.

Claim 101. (New) The article of manufacture as set forth in claim 99, wherein the digitized waveform is one of a plurality of waveforms of the EEG recording which

includes a montage of multiple channels of simultaneous waveforms, and wherein the computer readable program code means further comprises:

computer readable program code means for obtaining a subsequent waveform of the EEG recording; and

computer readable program code means for repeating steps performed by computer readable program code means (b)-(e) if unprocessed EEG data is available at the time T.

Claim102. (New): The article of manufacture as set forth in claim 101, wherein the computer readable program code means further comprises computer readable program code means for establishing a seizure event with a plurality of proximal seizure points from the waveforms of the montage.

Claim 103. (New): The article of manufacture as set forth in claim 102, wherein the computer readable program code means further comprises computer readable program code means for determining whether the seizure event is valid.

Claim 104. (New): The article of manufacture as set forth in claim 103, wherein the computer readable program code means further comprises computer readable program code means for notifying a user that a seizure is identified if the seizure event is valid.

Claim 105. (New): The article of manufacture as set forth in claim 104, wherein the computer readable program code means further comprises computer readable program code means for saving the time T and a description of the seizure.

Claim 106. (New): The article of manufacture as set forth in claim 103, wherein the computer readable program code means further comprises:

computer readable program code means for adding the time of the third predetermined duration to the time T; and

computer readable program code means for shifting the sliding window by the time of the third predetermined duration until the EEG recording is finished.

Claim 107. (New): The article of manufacture as set forth in claim 103, wherein the third predetermined duration is about 1 second.